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ABSTRACT

From the Toronto, Canada, longitudinal Study of Achievement, data on the school performance of children for whom English was a second language are presented. Data sources were pupil profile folders, teacher rating questionnaires, Metropolitan Achievement Test, Otis Quick-Scoring Mental Ability Test, student mobility cards, and referrals to psychological service. Approximately two-thirds of the subject population were monolingual (spoke only English) and one-third spoke only another language and/or English and another language. The results showed that: (1) those pupils for whom English was a second language overcame their performance deficit (due to lack of English fluency) by Grade 3 when they were ahead of monolingual students; (2) they were more likely to leave the school system and enter the separate school system than were monolinguals; (3) they were less likely to be referred to Child Adjustment Services; and (4) they were not a homogeneous group. Speculation regarding these findings center on whether (1) the bilingual advantage continues into the higher grades, (2) exposure to two languages raises school performance, and (3) selective immigration, "national differences," differential performance of rural and urban dwellers, or some other factors are being reflected. (JS)

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THE SCHOOL ACHIEVEMENT OF KINDERGARTEN PUPILS FOR WHOM ENGLISH IS A SECOND LANGUAGE: A LONGITUDINAL STUDY USING DATA FROM THE STUDY OF ACHIEVEMENT

R. S. Rogers
E. N. Wright

July, 1969

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HE BOARD OF EDUCATION FOR THE CITY OF TORONTO

There are no whole truths: all
truths are half truths. It is
trying to treat them as whole
truths that plays the devil.

Alfred North Whitehead.

FOREWORD

The longitudinal study of Toronto school children known as the "Study of Achievement" resulted in a wealth of data. Only a limited number of the many possible analyses of these data have so far been presented in published form.

The current document extends the range of information available from this study by providing data on the school performance of pupils for whom English was a second language.

Two other reports (Research Department, 1969, a and b), also based on the Study of Achievement, are parallel to this consideration of the E. S. L. pupil, and share several points in common with it.

TABLE OF CONTENTS

	Page Number
BACKGROUND	1
A Brief Outline of the Study of Achievement	1
Data Sources	2
Some Words of Caution	3
The Organization of the Report	4
THE SCHOOL PERFORMANCE OF E. S. L. PUPILS -- SELECTED DATA FROM THE STUDY OF ACHIEVEMENT POPULATION	6
Introduction	6
Results	7
1. The Proportion of E. S. L. Pupils in the Study of Achievement	7
2. The Countries of Birth of E. S. L. Pupils and Their Parents	7
3. The Movement of E. S. L. Pupils from the School System	8
4. The Proportion of E. S. L. Pupils Referred to Child Adjustment Services	8
5. The Performance of E. S. L. Pupils on Measures of School Achievement	8
6. The Relationship Between Country of Parental Origin and Measures of School Achievement	10
CONCLUDING SUMMARY	12
A SPECULATIVE OVERVIEW AND ITS IMPLICATIONS FOR FURTHER RESEARCH	13
BIBLIOGRAPHY	15
APPENDIX A	16
APPENDIX B	24

THE SCHOOL ACHIEVEMENT OF KINDERGARTEN PUPILS FOR WHOM ENGLISH IS A SECOND LANGUAGE: A LONGITUDINAL STUDY USING DATA FROM THE STUDY OF ACHIEVEMENT

BACKGROUND

In 1960, the Research Department of the Board of Education for the City of Toronto began a major longitudinal study of pupils through the early school years. This research project, known as the "Study of Achievement" was primarily an investigation into the nature of achievement -- the complex pattern of developmental changes that occur over time as the child interacts with the school environment.

A major outcome of this project was the development of a "data pool" from which the relationship of "achievement to a vast number of variables concerned with the home and social environment of the child could be examined. An increasing current interest in the school "success" of immigrant and other children exposed to two languages led to an examination of language variables and country-of-birth variables from this data pool.

The following two sections of this introduction provide a condensed account of the Study of Achievement, and the measures that were available for analysis.

A Brief Outline of the Study of Achievement[1]

The longitudinal Study of Achievement began in the Fall of 1960 with the children who enrolled in Junior Kindergarten at that time. The

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1 As the design of the Study of Achievement has been described elsewhere (Research Department Publications 1963, 1964, 1965, 1966) it will not be reproduced here in detail. The reader interested in information not given above is referred to the original sources.

following year all pupils who entered Senior Kindergarten were added to the study bringing the total study population to 8695, of whom 7209 had joined school at the Senior Kindergarten level while the remaining 1486 had begun in Junior Kindergarten. The basic population was thus all Senior Kindergarten pupils in 1961-1962. Data were collected about all those pupils remaining in the study population at a series of time-points up to June, 1968.

Each year of the study was designated by a new stage number (i.e. Stage I -- 1960-1961 or Stage III -- 1962-1963). When the phrase Grade 1 is used as an alternative to Stage III, the reader must understand that a few pupils at the Stage III point were actually still in Kindergarten while a very few others were already in Grade 2.

Data Sources

The data sources from the Study of Achievement which were drawn upon for this report are as follows:

1. Pupil Profile Folders completed by the Kindergarten teachers;
2. Teacher Rating Questionnaires completed by teachers in Senior Kindergarten, Grade 1 and Grade 3;
3. Metropolitan Achievement Tests administered in Grade 1 and Grade 3;
4. Otis Quick-Scoring Mental Ability Tests (New Edition -- Alpha Short Form) administered in Grade 2;
5. Student Mobility Cards completed by the participating schools;
6. Referrals to Psychological Services collected from the Child Adjustment Services.

The Pupil Profile Folder dealt with background information on the child, and included the parents' educational and occupational status, their country of origin and the languages spoken in the home. Other data collected

included position of the child in the family, number of children in the family, and number of adults in the dwelling. For this report, the Pupil Profile data were the source of information on: (a) whether a child spoke only English on entering school; such children are called Monolingual in this report, or (b) whether a child spoke only a language other than English or was bilingual in another language and English. These are denoted as E. S. L. pupils.

The Teacher Rating Questionnaires were designed to provide a method of approaching the broader and more intangible attributes of "achievement" in a quantifiable way. The teacher who had worked with the pupils for the year was asked to rate them on a variety of skills and behaviours which are often considered to be criteria of "achievement."

The Metropolitan Achievement Tests and the Otis Quick-Scoring Mental Ability Tests were incorporated into the study to provide standardized indices of achievement in reading, arithmetic, and general ability.

The Student Mobility Cards were the major information source as far as attrition was concerned, as they provided not only a measure of movement out of the system (and occasionally back in again), but also data on movement within the system.

The Referrals to Child Adjustment Services concerned the number pupils who were referred to Child Adjustment, the year of their first referral, and the reason(s) for that referral.

Some Words of Caution

The present data are only representative of E. S. L. pupils who entered school at the Junior or Senior Kindergarten level. The study design being longitudinal, children entering the school system after Kindergarten (for example, a 10 year old immigrant child) did not become

part of the population under examination. Thus, the data that follow are only representative of the performance of E. S. L. pupils who took all their schooling in English in Toronto.

It should be noted, also, that the data given in this report are based on samples, albeit generally large ones, from which population estimates have been extrapolated; therefore, statistical comparisons are not made (see Appendix B, p. 24). The general trends, however, are so marked that confidence can be placed in the conclusions, especially in instances where the data may be confirmed by the current cross-sectional study of New Canadians.

The completion of a longitudinal study means that a historical record of some events has been compiled. The findings reported in this document apply to the Toronto school system as it was between 1960 and 1968, and in particular as it was in interaction with those pupils who entered Senior Kindergarten in 1961. Those pupils are now (June, 1969) approaching 13 years of age. The progress of a child entering Kindergarten now could well differ in many respects from that which was traced for the Study of Achievement population. The schools certainly have changed over these eight years, but so too perhaps have the pupils, along with changes in the socio-economic and ethnic make-up of downtown Toronto. However, there are, also, some characteristics of a school system and its pupils that are less easily mutable. This report is offered in the hope that some of these more enduring features of schools and children will emerge from the information in it.

The Organization of the Report

The first section of this report is entitled, "The School Performance of E. S. L. pupils -- Selected Data From the Study of Achievement

Population." The use of the word, "selected" is intentional as the object has been to identify the major trends, differences and distinctions. The complete data, from which tables and graphs have been abstracted for convenience in reading, are presented as Appendix A (p. 16). Thus, at any point, the reader may examine for himself the overall pattern which is the basis for the statements in text.

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THE SCHOOL PERFORMANCE OF E. S. L. PUPILS -- SELECTED DATA FROM THE STUDY OF ACHIEVEMENT POPULATION

Introduction

Because large numbers of immigrants from non-English speaking countries have settled in Toronto, the teaching of English as a second language has become a persistent concern. This interest has evolved and expanded to include salient aspects of school achievement, adjustment, and communication with parents and culture. The studies and reports of the Research Department have not only reflected these concerns, but have also provided data for decision making.[2] The continuing importance of these issues was indicated by the Board of Education on June 22nd, 1967 when a "full scale research project" was requested.

While this "full scale research project" was planned to take a cross-sectional view of the Toronto school population, the Study of Achievement provided a data pool of longitudinal information which included language and country of birth as variables. It was decided, therefore, to analyze the Study of Achievement data to provide information complementary to that yielded by the cross-sectional study. Points of congruence in the findings between the two studies, naturally, could be treated with greater confidence as a basis for drawing conclusions than the results of either study alone.

To provide similar population bases to those used in the cross-sectional study, the data about pupils in the Study of Achievement were divided into two groups: English Monolinguals and those for whom English was a second language (E. S. L.). The Monolinguals were children who,

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2 Report to the Management Committee, December 3, 1965.

on registration in Kindergarten, were reported to speak only English. Undoubtedly, a few of these Monolinguals would have come from homes where another language was used occasionally. The E. S. L. pupils were a more varied group: some spoke no English, and others spoke fluent English at the time of registration. These children are labelled E. S. L. because it can be presumed that even where fluency in English was not present on entering Kindergarten it would develop fairly rapidly in the school environment.

Results

1. The Proportion of E. S. L. Pupils in the Study of Achievement

The distribution of the Study of Achievement population was as follows:

Pupils speaking only English (Monolingual)		65.16%	
Pupils speaking English and another tongue	(E. S. L.)	28.16%	34.84%
Pupils speaking only a non-English tongue(s)		6.68%	

Thus, slightly over one-third of the pupils were categorizable as E. S. L. These figures also indicate that about one-quarter of these E. S. L. pupils spoke no English on entering school.

2. The Countries of Birth of E. S. L. Pupils and Their Parents

Seven out of every ten E. S. L. pupils were born in Canada. Among those speaking no English on entering school, about half were Canadian born. However, when parents' birthplaces were considered it was found that only 5% of the fathers of E. S. L. pupils, and 9% of their mothers were born in Canada.

About one-third of the E. S. L. pupils born outside Canada were born in Italy; this was the largest single non-native group. Italy was

the largest single birthplace of the parents of E. S. L. pupils accounting for nearly 38% of pupils from all countries mentioned (Tables 4, 5, and 6, Appendix A).

3. The Movement of E. S. L. Pupils from the School System

In a report parallel to the present document (Research Department, 1969, a) data are reported on the attrition rates of E. S. L. pupils (rates at which students leave the Toronto public schools to attend other school systems). It was found that the E. S. L. pupils were some 20% more likely to move out of the school system, and when they did move, they were more likely to enter separate schools, as compared to pupils Monolingual in English.

4. The Proportion of E. S. L. Pupils Referred to Child Adjustment Services

In another report based on the Study of Achievement data pool, the referral rates of E. S. L. and Monolingual pupils were compared (Research Department, 1969, b). The E. S. L. group was found to have a rate of referral about 30% less than that for Monolinguals. The same report also discusses some of the differences in the reasons teachers gave when making referrals from these two groups of pupils.

5. The Performance of E. S. L. Pupils on Measures of School Achievement

Figure 1 summarizes the comparative performance of Monolingual and E. S. L. pupils on three measures related to "achievement" -- I.Q., teacher ratings, and standardized tests. The change over time is dramatic. The E. S. L. pupils, on the average, move from a position of considerable disadvantage in Senior Kindergarten to a position of at least equivalence, or even marginal superiority, by Grade 3.

The detailed tables (2 and 3, Appendix A) indicate that the language deficit of the E. S. L. pupils noted by the Senior Kindergarten teachers was no longer demonstrable in the Grade 3 Metropolitan Achievement Test scores.

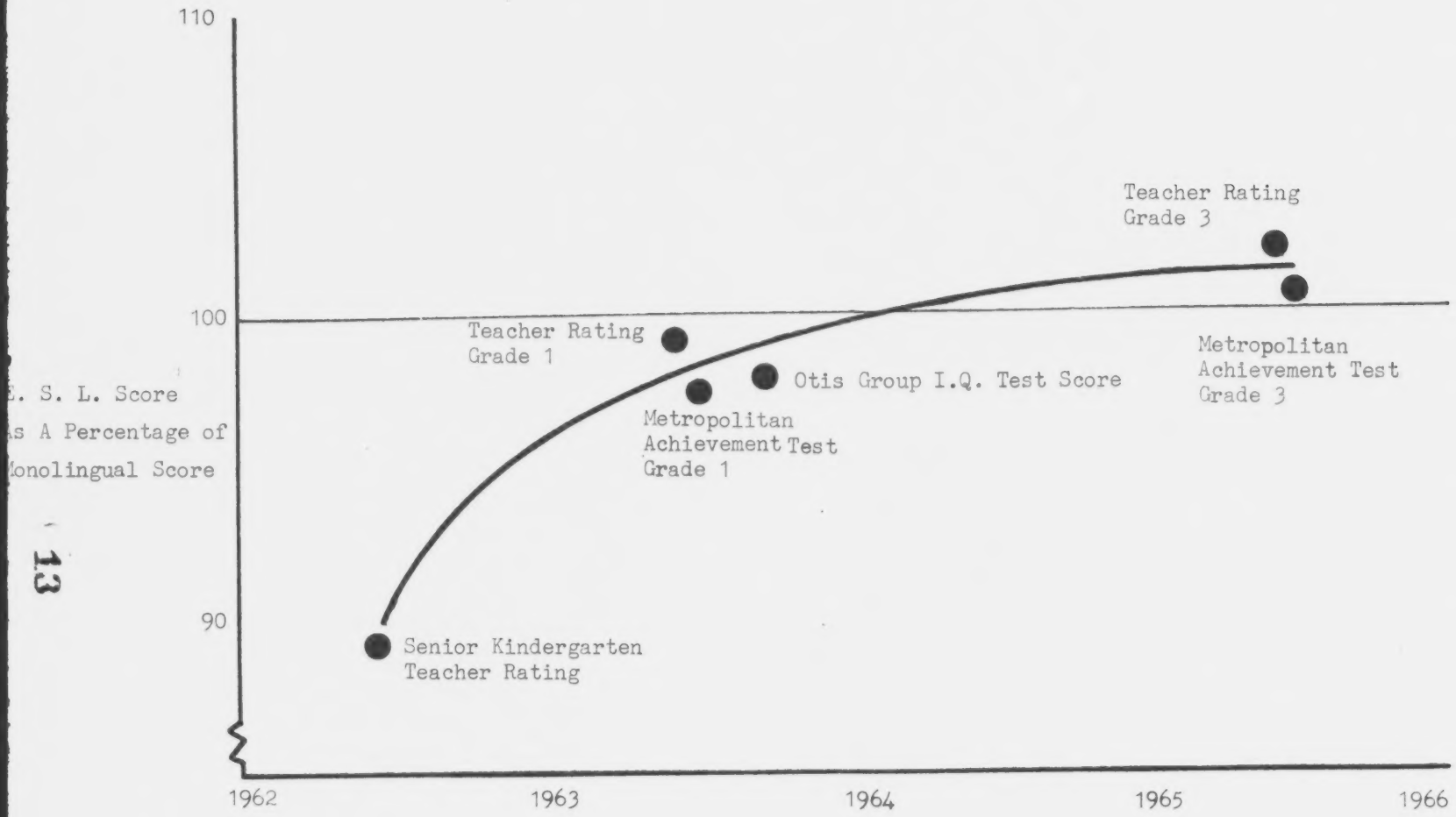

Figure 1. Achievement scores over time. These data have been obtained by dividing the mean for the E. S. L. group by that for the Monolinguals on the same measure, and multiplying the result by 100. Thus values over 100 indicate that the E. S. L. group scored higher than the Monolinguals, while values less than 100 indicate the opposite. (See Appendix for raw data.)

6. The Relationship Between Country of Parental Origin and Measures of School Achievement

Those identified in this report as E. S. L. pupils were the children of parents born in various lands. Their parents' motivations for coming to Canada were probably not the same in the many countries from which they came. One likely result of this differential pattern of emigration is that, on the average, immigrants from one country would differ from those from another in such socio-economic variables as occupation, years of schooling, and urban or rural background. As these variables are often potent predictors of school achievement within our own culture, the possibility exists that the various national groups represented by the E. S. L. pupils would show dissimilar average levels of school achievement. It seemed appropriate, therefore, to examine the Study of Achievement data to provide some independent evidence on this point. This same possibility will be the subject of a later report on pupils who learn English as a second language.

The data available from the Study of Achievement were not coded by specific language groups, but by parents' country of birth. Where there was a sufficiently large group of pupils for whom both parents were born in the same country, the average score on various measures of achievement was calculated for that national group. Table 7, Appendix A, presents these averages. For a variety of reasons, these results must be viewed with CAUTION: the sample sizes are relatively small. Only certain countries of origin are represented individually. No data on socio-economic variables among the various parental nationalities are given, and the divisions are not directly comparable to the Monolingual versus E. S. L. distinction used elsewhere in this report. Thus, although the performances of various subgroups are given, not enough additional information is available to account for the selection process that resulted in the varied performances.

For the samples considered, it would seem that the Italian and Portuguese pupils did less well on the average than those whose parents were born in Germany or the United Kingdom. Hypotheses that would account for such a phenomenon would include that of "selection by the emigration process" outlined on the previous page, and also interpretations that would reinforce North American research findings on "poverty" and "cultural disadvantage" to families that may be said to have a subculture different from the school's.

CONCLUDING SUMMARY

Two important generalizations can be made from the findings which have been presented:

(a) The E. S. L. pupil has an average pattern of school performance distinctly different from that of the Monolingual pupil;

(b) The E. S. L. pupils are not a homogeneous group.

In comparison to the Monolingual pupil, the E. S. L. pupil starts schools with a considerable performance deficit, presumably due to his lack of fluency in English. This deficit is overcome by Grade 3 at which time he is, if anything, ahead of his Monolingual classmates. His mobility pattern is also different from that of Monolingual pupils. He is more likely to leave the school system, and when he does leave, the E. S. L. pupil is more likely to enter the separate school system than a Monolingual pupil.

A final difference is found in referrals made by the teacher to Child Adjustment Services. The E. S. L. pupil is less likely to be referred, and the pattern of referral reasons also differs from those in the Monolingual group.

The evidence that the pupils for whom English is a second language are not a homogeneous group is important thought not unexpected. It is useful to note that the category "immigrants," or the category E. S. L. pupils, are not reliable labels to be used in planning the education of young people. Not only do immigrants vary in their facility with English, they vary also in the deficits and/or assets with which they enter the school system.

A SPECULATIVE OVERVIEW AND ITS IMPLICATIONS FOR FURTHER RESEARCH

The brief conclusions just presented are deliberately restricted to a restatement of the major findings. This section may be seen as an extension and generalization of the findings for the purpose of generating hypotheses that may warrant further investigation at some future time.

The phenomenon whereby the E. S. L. group was found to have a marginally better performance at the end of Grade 3 despite an earlier disadvantage, provides the starting point for many interesting lines of thought. Firstly, it is interesting to ask whether the advantage continues into higher grades or not, and if so, whether an even greater difference in performance by the E. S. L. group would be found at the high school and university levels. Secondly, do the findings indicate that a deliberate policy of exposing all children to two languages might actually raise school performance?

Obviously, the data do not answer these questions, but perhaps in the differential performance of the various ethnic groups there are clues. Could it be that the higher performance of the E. S. L. group is caused by the fact that, on average, they were a superior group of performer? Were they a select group by virtue of the mobility of their parents towards a materially richer culture? And what of the differences among the ethnic groups themselves? Did these findings reflect selective immigration, "national differences," the differential performance of rural and urban dwellers, or some other factor?

Obviously, investigation into these questions, and questions about "making up deficits" might provide more information about early

schooling and provisions for the "culturally deprived." More evidence about immigrant children will be available as the results of the current "New Canadian Study" are published (Research Department, 1969, c). This research isolates many of the variables that were intertwined in the Study of Achievement design. The reports of the Department, both published and in progress, will provide much information related to these broader educational concerns.

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All publications listed below were prepared by the Research Department of the Board of Education for the City of Toronto and are referred to only by title and data.

Study of Achievement Reports

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Italy -- A critical bibliography of materials on Italy. 1969.

Italian immigrants and Italy: an introduction to the multi-media package on Italy. 1969.

Education and Italy. 1969.

APPENDIX A

TABLE 1

EXTRAPOLATED* VALUES FOR THE METROPOLITAN ACHIEVEMENT SCORES OF MONOLINGUAL AND E. S. L. PUPILS FOR THE STUDY OF ACHIEVEMENT POPULATION

Subtest Title	Monolinguals' Average Score	E. S. L. Pupils' Average Score
Grade 1		
Word Knowledge	49.5	49.3
Word Discrimination	49.7	49.5
Reading	47.8	45.5
Arithmetic	49.2	47.6
TOTAL	196.3	191.9
Grade 3		
Word Knowledge	47.3	45.9
Word Discrimination	48.2	47.3
Reading	46.6	45.8
Spelling	51.0	52.5
Language A	50.6	51.3
Language B	48.1	49.1
Arithmetic Computation	48.1	50.5
Arithmetic Problem Solving	47.6	48.2
TOTAL	387.6	390.4

* Procedures for extrapolation are reported as Appendix B.

TABLE 2

EXTRAPOLATED* VALUES FOR THE I.Q. SCORES OF MONOLINGUAL AND E. S. L. PUPILS IN THE STUDY OF ACHIEVEMENT POPULATION

	Mean I.Q. (Grade 2)
Monolingual Pupils	103.5
E. S. L. Pupils	101.0

* Procedures for extrapolation are reported as Appendix B.

TABLE 3

EXTRAPOLATED* VALUES FOR THE TEACHER RATING SCORES OF MONOLINGUAL AND E. S. L. PUPILS FOR THE STUDY OF ACHIEVEMENT POPULATION

Subtest Title	Monolinguals' Average Score	E. S. L. Pupils' Average Score
First Teacher Rating Questionnaire Given at Stage II (Senior Kindergarten)		
Language Scale	38.8	32.8
Social Scale	23.7	21.7
Mental Scale	72.2	60.7
Physical Scale	27.1	27.0
Emotional Scale	32.5	30.9
TOTAL	194.3	173.1
Second Teacher Rating Questionnaire Given at Stage III (Grade 1)		
Language Scale	35.8	33.3
Social Scale	20.3	20.9
Mental Scale	35.3	35.1
Physical Scale	13.6	14.1
Emotional Scale	28.0	28.7
TOTAL	133.0	132.1
Third Teacher Rating Questionnaire Given at Stage V (Grade 3)		
Adjustment Scale	18.9	19.7
Performance Scale	20.9	21.2
Creativity Scale	11.7	11.6
Prediction Scale	3.7	3.8
TOTAL	55.1	56.3

* Procedures for extrapolation are reported as Appendix B.

TABLE 4

LANGUAGE OF PUPILS AND THEIR COUNTRY OF BIRTH

Pupils' Country of Birth	Pupil Speaks Only A Non-English Tongue(s)[a] (I)	Pupil Speaks English And Another Tongue[b] (II)	E. S. L. Pupils[c]	Speaks Only English Monolingual[d] Pupil	All Pupils in Study of Achievement (III)
Canada	53.1%	74.1%	70.1%	93.7%	85.9%
United Kingdom	0.7%	0.7%	0.7%	3.2%	2.3%
U. S. A.	0.0%	0.0%	0.0%	0.6%	0.4%
Italy	23.1%	7.5%	10.5%	1.6%	4.7%
Germany	4.1%	4.8%	4.7%	0.0%	1.5%
Portugal	4.8%	3.4%	3.7%	0.0%	1.0%
All Others	14.3%	9.5%	10.4%	0.9%	4.2%

a Based on a random sample of 147 pupils who spoke no English.

b Based on a random sample of 147 pupils who spoke English and another tongue.

c Average of Columns (I) and (II) weighted by population size.

d Obtained by comparison of Study of Achievement data (Research Department, 1963), Column (III), with combined values of Columns (I) and (II).

TABLE 5

LANGUAGE OF PUPILS AND COUNTRY OF FATHERS' BIRTH

Fathers' Country of Birth	Pupil Speaks Only A Non-English Tongue(s)[a] (I)	Pupil Speaks English And Another Tongue[b] (II)	E. S. L. Pupils[c]	Speaks Only English Monolingual[d] Pupil	All Pupils in Study of Achievement (III)
Canada	4.1%	5.4%	5.2%	78.8%	53.2%
United Kingdom	0.7%	0.0%	0.1%	9.9%	6.5%
U. S. A.	0.0%	0.0%	0.0%	1.5%	1.0%
Italy	49.7%	34.7%	37.6%	2.0%	14.4%
Germany	5.4%	5.4%	5.4%	1.6%	2.9%
Portugal	5.4%	3.4%	3.8%	0.0%	1.2%
All Others	34.7%	51.0%	47.9%	6.3%	20.8%

a Based on a random sample of 147 pupils who spoke no English.

b Based on a random sample of 147 pupils who spoke English and another tongue.

c Average of Columns (I) and (II) weighted by population size.

d Obtained by comparison of Study of Achievement data (Research Department, 1963), Column (III), with combined values of Columns (I) and (II).

TABLE 6

LANGUAGE OF PUPILS AND COUNTRY OF MOTHERS' BIRTH

Mothers' Country of Birth	Pupil Speaks Only A Non-English Tongue(s)[a] (I)	Pupil Speaks English And Another Tongue[b] (II)	E. S. L. Pupils[c]	Speaks Only English Monolingual[d] Pupil	All Pupils in Study of Achievement (III)
Canada	3.4%	10.2%	8.9%	80.6%	55.6%
United Kingdom	0.7%	0.7%	0.7%	9.1%	6.2%
U. S. A.	0.0%	0.0%	0.0%	1.5%	1.0%
Italy	49.7%	34.7%	37.5%	1.6%	14.1%
Germany	7.5%	8.2%	8.1%	1.7%	3.9%
Portugal	4.8%	3.4%	3.7%	0.0%	1.2%
All Others	34.0%	42.9%	41.1%	5.6%	18.0%

a Based on a random sample of 147 pupils who spoke no English.

b Based on a random sample of 147 pupils who spoke English and another tongue.

c Average of Columns (I) and (II) weighted by population size.

d Obtained by comparison of Study of Achievement data (Research Department, 1963), Column (III), with combined values of Columns (I) and (II).

TABLE 7

LAND OF BOTH PARENTS' BIRTH AND MEASURES OF PUPILS' ACHIEVEMENT*

Land of Both Parents' Birth	Average Otis I.Q. Score	Average Total Score on Teacher Ratings			Average Score on the Metropolitan Achievement Tests	
		S. K.	Gr. 1	Gr. 3	Gr. 1	Gr. 3
Canada	106.4	185.2	150.5	59.6	199.8	379.2
Great Britain	107.9	228.8	145.9	60.6	207.0	426.9
Italy	100.0	150.3	109.2	42.0	173.6	350.4
Germany	108.1	184.1	134.3	57.7	184.2	423.5
Portugal	96.2	138.8	103.4	52.8	152.5	339.5
All other countries (except U. S. A.)	102.7	173.7	125.1	60.1	186.4	401.4
FOR COMPARISON:						
All Pupils in Study of Achievement	103.5	190.2	134.5	56.6	194.3	390.5

* Averages based on random samples of 45 pupils for each country.

APPENDIX B

THE EXTRAPOLATION OF BEST ESTIMATES OF ACHIEVEMENT SCORES FOR MONOLINGUAL AND E. S. L. PUPILS

Six sets of data were available using a stratified random sample of 543 non-referred pupils, and the complete population of referrals of 1840 pupils distributed as follows:

1 - Means of all test completions by E. S. L. boy non-referrals based on a random sample of 144;

2 - Means of all test completions by E. S. L. girl non-referrals based on a random sample of 146;

3 - Means of all test completions by Monolingual boy non-referrals based on a random sample of 147;

4 - Means of all test completions by Monolingual girl non-referrals based on a random sample of 146;

5 - Means of all test completions by E. S. L. referrals based on a population of 471 E. S. L. referrals;

6 - Means of all test completions by Monolingual referrals based on a population of 1369 Monolingual referrals.

The following best estimates of the population were used as weights for extrapolation:

E. S. L. Boy Non-Referrals	1280
E. S. L. Girl Non-Referrals	1279
Monolingual Boy Non-Referrals	2038
Monolingual Girl Non-Referrals	2258
All E. S. L. Non-Referrals	2559
All Monolingual Non-Referrals	4296
All E. S. L. Referrals	471
All Monolingual Referrals	1369

The Extrapolations were derived as follows:

Best Estimate of Language Group Non-Referral Mean

$$= \frac{\text{(Number of Boys x Mean for Boys) + (Number of Girls x Mean for Girls)}}{\text{Total Size of Language Group Non-Referrals}} = Z$$

e.g., for the E. S. L. Group --

$$Z = \frac{\text{(1280 x Mean for Boys) + (1279 x Mean for Girls)}}{2559}$$

Using (Z) the Best Estimate of Total Language Group Mean

$$= \frac{\text{(Number of Non-Referrals x Non-Referral Mean) + (Number of Referrals x Referrals Mean)}}{\text{Total Size of Language Group}}$$

e.g., for the E. S. L. Group --

$$= \frac{\text{(2559 x Non-Referral Mean (Z)) + (471 x Referral Mean)}}{3030}$$

The values obtained were used in Tables 1, 2, and 3 which are the bases for Figure 1.